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CLAIMS

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[Utility model registration claim]

[Claim 1] The ceramic honeycomb structure object with which it consists of a ceramic honeycomb object with which it has the through tube of a large number surrounded by the septum, and the septum of an outer-diameter dimension smaller than a predetermined outer-diameter dimension and really formed roundness of 0.5mm is exceeded, and dimensional accuracy has a bad peripheral wall, and an enveloping layer of the uneven thickness prepared on the peripheral wall of this ceramic honeycomb object, and the outer-diameter dimension of this enveloping layer is characterized by to become a predetermined outer-diameter dimension with the sufficient roundness of 0.5mm or less and dimensional accuracy.

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## DETAILED DESCRIPTION

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[Detailed explanation of a design]

(Field of the Invention)

This design is related with the ceramic honeycomb structure object used as purification of the support for emission-gas-purification catalysts of internal combustion engines, such as an automobile, a particle clarifying filter (it indicates below as 'Diesel Particulate Filter' DPF) and various gas, and the combustion gas that uses petroleum as a fuel, and/or support for deodorization catalysts.

(Prior art)

In recent years, in relation to the air pollution control, the catalytic converter is used for exhaust-gas purification from the internal combustion engine. A catalytic converter usually to cordierite system ceramic honeycomb support Active substances, such as gamma-alumina with a big specific surface area, are coated. In this gamma-alumina layer Platinum, The honeycomb-like catalyst which made the catalyst of noble metals, such as palladium and a rhodium, support A maintenance sealant is made to be placed between the cases which consist of stainless steel etc., it inserts in them tightly, this is arranged to the path of the exhaust gas discharged by the internal combustion engine, and the hydrocarbon in an exhaust gas, a carbon monoxide, nitrogen oxides, etc. are oxidized or reduction purified in a honeycomb-like catalyst bed.

(Trouble which a design tends to solve)

By the way, although this ceramic honeycomb support is manufactured through each process of press shaping, desiccation, and baking, the dimension error and deformation which are hard to avoid to ceramic honeycomb support in each process occur. First, in an extrusion-molding process, since the generated type article by which extrusion molding was carried out contains water, a binder, etc., it is very soft, and it deforms easily with a self-weight. For example, when the cel of the periphery section is crushed by the large-sized article [ like / with a diameter of 300mm ] with a self-weight when it extrudes in the direction perpendicular to gravity, and it extrudes in the direction parallel to gravity, the lower part of a generated type article starts a buckling with a self-weight. Furthermore, at desiccation / baking process, desiccation and/or baking cannot be completely carried out to homogeneity, and, for this reason, the variation in contraction is produced by each part of a product. Therefore, the precision of an outer-diameter dimension is a little inferior in the done product, and it has the fault that cylindricity is not good, either.

The purpose of this design is to use as an offer plug the ceramic honeycomb structure object which attained a predetermined outer-diameter dimension and cylindricity.

(Means for solving a trouble)

The ceramic honeycomb object with which the ceramic honeycomb structure object of this design has the through tube of a large number surrounded by the septum, and exceeds the septum of an outer-diameter dimension smaller than a predetermined outer-diameter dimension, and really formed roundness of 0.5mm, and dimensional accuracy has a bad peripheral wall, It consists of enveloping layers of the uneven thickness prepared on the peripheral wall of this ceramic honeycomb object, and the outer-diameter dimension of this enveloping layer is characterized by becoming a predetermined

outer-diameter dimension with the sufficient roundness of 0.5mm or less and dimensional accuracy.  
(Operation)

This design can amend a predetermined outer-diameter dimension while amending deformation by partially or on the whole giving the enveloping layer which compensates for the difference of a predetermined outer-diameter dimension and a dressed size to the peripheral wall of a ceramic honeycomb object smaller than a predetermined outer-diameter dimension. When this accumulates and it is tightly inserted in the catalyst for internal combustion engines, or the case of DPF through the sealant or cushioning material for gas leakage prevention and vibrability-proof Although the thickness of a sealant or a cushioning material is changed in order to amend the variation of tolerance or it has been made adapted [ using a thick thing ] in the former if dimensional accuracy is bad in order to store a sealant or a cushioning material in the range of the fixed planar pressure force When dimensional accuracy is good, the moreover comparatively thin ingredient of fixed thickness can be used, and also economically, it becomes good.

Moreover, for example, with the ceramic honeycomb object manufactured by the extrusion method, although minute wave-like irregularity is generated in a peripheral wall at that direction of extrusion, the enveloping layer of this design buries that minute irregularity, and considers as a smooth front face, consequently its seal engine performance of gas improves.

(Example)

The example of this design is explained below.

The ceramic honeycomb object 1 acquired by carrying out extrusion molding of the KOJU light raw material has a septum 2 and a peripheral wall 3, as shown in Fig. 1 , and it is formed by this septum 2, and a through tube 4 is formed. Although the cross-section configuration of this through tube 4 is illustrated by the shape of a square, it can consider as arbitrary configurations, such as polygons, such as the shape of another hexagon, circular, and an ellipse form.

The enveloping layer 5 after baking is formed in this ceramic honeycomb object 1 after desiccation so that it may describe in the following examples, and the ceramic honeycomb structure object 6 is formed in it (however, the enveloping layer is exaggerated and shown in drawing).

0.3mm in example 1 rib thickness, cel consistency 46.5 cel / cm<sup>2</sup>, the maximum outer diameter of 102mm, The dried ceramic honeycomb object with an overall length [ of 103mm ], and a roundness of 0.7mm made from cordierite Put in into a circle barrel with a bore [ of 103\*\*0.1mm ], and a height of 103mm, and a cordierite slurry is slushed between \*\* of a ceramic honeycomb object and a cylinder inside-of-the-body periphery. The desiccation article with the dried maximum outer diameter of 102.5mm, an overall length [ of 103mm ], and a roundness of 0.1mm was calcinated at 1300-1470 degrees C, and the ceramic honeycomb structure object with the maximum outer diameter of 99.9mm, an overall length [ of 100mm ], and a roundness of 0.4mm was acquired. As for this ceramic honeycomb structure object, the minute irregularity of a peripheral wall was not seen.

The dried ceramic honeycomb object with 0.17mm of example 2 rib thickness, cel consistency 62 cel / cm<sup>2</sup>, the maximum outer diameter of 99mm, an overall length [ of 100mm ], and a roundness of 0.8mm made from cordierite was put in into the cylinder object with a bore [ of 101\*\*0.1mm ], and a height of 100mm, the cordierite slurry was slushed, it calcinated after that, and the ceramic honeycomb structure object with a maximum outer diameter [ of 100.1mm ] and a roundness of 0.2mm was acquired. The minute irregularity of a peripheral wall was not seen for this honeycomb structure object, either.

An aluminum plate with a diameter [ of 100mm ] and a thickness of 20mm is applied to the vertical end face of a ceramic honeycomb structure object, and the lateral surface is stopped with the urethane sheet of 0.5mm thickness, a package and a vinyl tape are stopped with an aluminum plate, and it seals, and puts into the pressurized container containing water, and the pressure was heightened gradually and it was made to destroy, in order to investigate the mechanical strength of this ceramic honeycomb structure object until a noise of crack formation occurred (this pressure is called "AISO static reinforcement"). The pressures at this time are 30 kgf/cm<sup>2</sup>, and reinforcement of the ceramic honeycomb structure object which did not prepare an enveloping layer is improving twice [ about ] to having destroyed by pressure 13 kgf/cm<sup>2</sup>.

After applying the mortar of alumina cement to the ceramic honeycomb object made from cordierite with which the same configuration as example 3 example 2 was calcinated and drying it, it machined and the ceramic honeycomb structure object with a maximum outer diameter [ of 100mm ] and a roundness of 0.1mm was acquired.

0.43mm in example 4 rib thickness, cel consistency 15.5 cel / cm<sup>2</sup>, the up maximum outer diameter of 298mm, On the calcinated large-scale ceramic honeycomb object for DPF with the lower maximum outer diameter of 302mm, an overall length [ of 355mm ], and a roundness of 4.1mm made from cordierite It applies and alumina cement mortar was dried so that it might become the outer diameter of about 310mm, this desiccation article was machined and the ceramic honeycomb structure object whose roundness of the outer diameter of 305\*\*0.3mm, the upper part, and the lower part is 0.2mm and 0.4mm, respectively was acquired.

In addition, in the above-mentioned example, in order to obtain the good product of whenever [ outer-diameter dimension and roundness, or profile ], it is good to produce a ceramic honeycomb object small beforehand and to prepare the enveloping layer of a predetermined dimension in this periphery. What the coefficient of thermal expansion which includes the same quality of the material as a ceramic honeycomb object or the same quality of the material in a part becomes from the similar quality of the material as an ingredient with which a peripheral wall is coated is suitable. Moreover, coating is performed after baking, and although not re-calcinating is desirable from dimensional accuracy and cost, since a ceramic honeycomb object and an enveloping layer are not united, when a thermal shock is strong, an enveloping layer may exfoliate. On the other hand, although a ceramic honeycomb object and an enveloping layer are united and it does not exfoliate in a thermal shock when this quality of the material is coated and calcinated to green ware, it is easy to receive deformation by baking, therefore the dimensional accuracy of a ceramic honeycomb structure object is inferior a little. Although there is also no exfoliation and a dimensional accuracy top is also desirable when performing and re-calcinating coating to a burned product furthermore, it becomes disadvantageous on cost. The approach of giving three kinds of above coating materials needs to choose according to an application.

although the example of this design was explained above, this design is not limited to the above-mentioned example, and can change and deform into versatility. For example, although the cylinder object was explained in the example, this design is applicable similarly about an ellipse outer-diameter article. Moreover, other ingredients may be used although the quality of the material used cordierite. It is not necessary to cover an enveloping layer over the perimeter of a ceramic honeycomb structure object, and it can also be made to put only on a part.

Moreover, an enveloping layer can be given, before making a ceramic honeycomb object support a catalyst, or also after making it support.

(Effectiveness of a design)

By this design, since it can have a predetermined outer-diameter dimension and predetermined cylindricity and dimensional accuracy moreover becomes good, in case a ceramic honeycomb structure object is applied to exhaust gas catalyst equipment and an exhaust gas purge; it can use the comparatively thin sealant of fixed thickness, and, also economically, becomes good. Furthermore, the minute irregularity of the periphery of the ceramic honeycomb object generated on extrusion molding is buried, it considers as a smooth front face, and the gas-seal engine performance improves.

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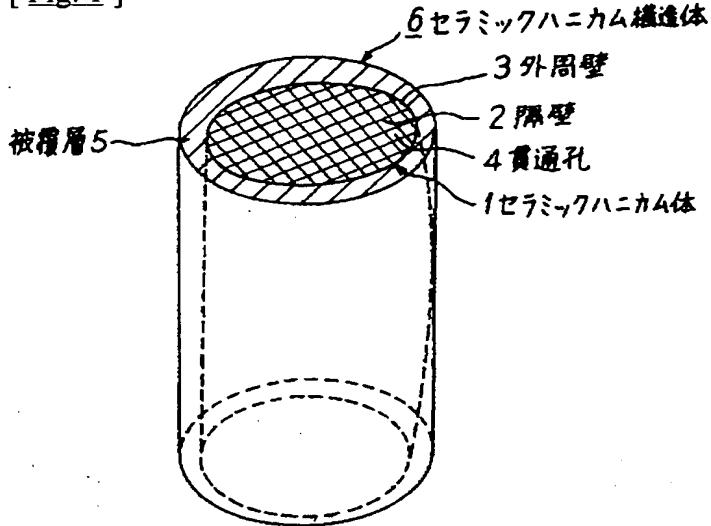
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## DRAWINGS

[ Fig. 1 ]



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(19) 日本国特許庁 (JP)

## (12) 実用新案公報 (Y2)

(11) 実用新案出願公告番号

実公平7-183

(24) (44) 公告日 平成7年(1995)1月11日

(51) Int.CI<sup>1</sup>  
B 01 J 35/04識別記号 市内整理事号  
301 M 8017-4G

P I

技術表示箇所

(全 3 頁)

(21) 出願番号 実願昭62-37125  
 (22) 出願日 昭和62年(1987)3月16日  
 (65) 公開番号 実開昭63-144838  
 (43) 公開日 昭和63年(1988)9月22日  
 審査番号 平5-7089

(71) 出願人 99999999  
 日本碍子株式会社  
 愛知県名古屋市瑞穂区須田町2番56号  
 (72) 考案者 水谷 黃  
 愛知県名古屋市瑞穂区須田町2番22号  
 (73) 考案者 土方 俊彦  
 愛知県名古屋市瑞穂区神沢2丁目1807番地  
 (74) 考案者 原田 篤  
 愛知県名古屋市名東区大針1丁目218番地  
 (74) 代理人 弁理士 杉村 晴秀 (外1名)

審査の合議体  
 審査長 渡辺 順之  
 審査官 唐戸 光雄  
 審査官 鮎永 美男

(56) 参考文献 特開 昭50-142805 (JP, A)  
 特公 昭51-44713 (JP, B2)

(54) [考案の名称] セラミックハニカム構造体

1  
 【実用新案登録請求の範囲】  
 【請求項1】隔壁で囲まれる多数の貫通孔を有し、所定の外径寸法より小さい外径寸法の隔壁と一体形成された真円度0.5mmを超過寸法精度が悪い外周壁を有するセラミックハニカム体と、このセラミックハニカム体の外周壁上に設けた不均一な厚さの被覆層とから構成され、この被覆層の外径寸法が真円度0.5mm以下と寸法精度が良い所定の外径寸法となることを特徴とするセラミックハニカム構造体。

【考案の詳細な説明】

【産業上の利用分野】

本考案は、自動車等の内燃機関の排ガス浄化触媒用担体および微粒子浄化用フィルタ (「Diesel Particulate Filter」以下 DPF と記載する)、および各種ガス、石油を燃料とする燃焼ガスの浄化および/または脱臭触媒用担

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 体として用いられるセラミックハニカム構造体に関するものである。

【従来の技術】

近年、大気汚染防止に開拓し内燃機関からの排出ガス浄化に触媒コンバータが使用されている。触媒コンバータは、通常コーチェライト系セラミックハニカム担体に、比表面積の大きなヤーアルミナ等の活性物質をコーティングし、このヤーアルミナ層に白金、パラジウム、ロジウム等の貴金属の触媒を担持させたハニカム状触媒を、ステンレス鋼などからなるケースに、保持シール材を介在させて密嵌し、これを内燃機関から排出される排出ガスの通路に配置し、排出ガス中の炭化水素、一酸化炭素、窒素酸化物等をハニカム状触媒床にて酸化あるいは還元浄化するものである。

【考案が解決しようとする問題点】

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ところで、かかるセラミックハニカム担体は、押圧成形、乾燥、焼成の各工程を経て製作されるが、各工程においてセラミックハニカム担体に、避けがたい寸法誤差および変形が発生する。まず、押出成形工程において、押出成形された生成形品が水、バインダ等を含有するため非常に柔かく、自重により容易に変形する。例えば直徑300mmのような大型品では、重力に垂直な方向に押出された場合には、外周部のセルが自重によりつぶれ、また重力と平行な方向に押出された場合には、生成形品の下部が自重により座屈を起こす。さらに乾燥・焼成工程では、完全に均一に乾燥および/または焼成を行うことができなく、このため製品の各部分によって収縮率のバラツキを生じる。したがって、出来上がった製品は、外径寸法の精度がやや劣り、また円筒度も良くないという欠点がある。

本考案の目的は、所定の外径寸法および円筒度を達成したセラミックハニカム構造体を提供せんとするにある。

(問題点を解決するための手段)

本考案のセラミックハニカム構造体は、隔壁で囲まれる多数の貫通孔を有し、所定の外径寸法より小さい外径寸法の隔壁と一体形成された真円度0.5mmを超える寸法精度が悪い外周壁を有するセラミックハニカム体と、このセラミックハニカム体の外周壁上に設けた不均一な厚さの被覆層とから構成され、この被覆層の外径寸法が真円度0.5mm以下と寸法精度が良い所定の外径寸法となることを特徴とするものである。

(作用)

本考案は、所定の外径寸法より小さいセラミックハニカム体の外周壁に所定の外径寸法と実際の寸法との差を備う被覆層を部分的または全体的に施すことにより、変形を補正するとともに、所定の外径寸法を修正することができる。これがため、内燃機関用の触媒あるいはDPFのケースにガス漏れ防止および耐振動性のためのシール材もしくはクッション材を介して密嵌される場合に、従来ではシール材もしくはクッション材を一定の面圧力の範囲に收めるため、寸法精度が悪いとその寸法差を補正する目的でシール材もしくはクッション材の厚さを変化させたり、厚いものを使用して適応させてきたが、寸法精度が良い場合には一定の厚さのしかも比較的薄い材料を使用でき、経済的にも良好となる。

また、例えば、押出成形法で製作されたセラミックハニカム体では、外周壁にその押出方向に波状の微小な凹凸を発生するが、本考案の被覆層はその微小な凹凸を埋めて平滑な表面とし、この結果、ガスのシール性能が向上する。

(実施例)

以下に本考案の実施例を説明する。

コーチュライト原料を押出し成形して得られるセラミックハニカム体1は、第1図に示すように、隔壁2および外周壁3を有し、この隔壁2に画成されて貫通孔4が形

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成される。この貫通孔4の断面形状は四角形状で図示しているが、この他の六角形状などの多角形、円形、橢円形等の任意な形状とすることができます。

このセラミックハニカム体1には、以下の実施例に記すように乾燥後、あるいは焼成後被覆層が形成され、セラミックハニカム構造体6を形成している（ただし、図において被覆層を誇張して示している）。

実施例1

リブ厚さ0.3mm、セル密度45.5セル/cm<sup>2</sup>、最大外径102mm、全長103mm、真円度0.7mmの乾燥されたコーチュライト製のセラミックハニカム体を、内径103±0.1mm、高さ103mmの円筒体に入れ、セラミックハニカム体と円筒体内周との間にコーチュライト泥を流し込み、乾燥させた最大外径102.5mm、全長103mm、真円度0.1mmの乾燥品を1300~1470°Cで焼成し、最大外径99.9mm、全長100mm、真円度0.4mmのセラミックハニカム構造体を得た。このセラミックハニカム構造体は外周壁の微小な凹凸がみられなかった。

実施例2

リブ厚0.17mm、セル密度62セル/cm<sup>2</sup>、最大外径99mm、全長100mm、真円度0.8mmの乾燥されたコーチュライト製のセラミックハニカム体を、内径101±0.1mm、高さ100mmの円筒体の中に入れ、コーチュライト泥を流し込み、その後焼成して、最大外径100.1mm、真円度0.2mmのセラミックハニカム構造体を得た。このハニカム構造体も外周壁の微小な凹凸がみられなかった。

このセラミックハニカム構造体の機械的強度を調べるため、セラミックハニカム構造体の上下端面に直徑100mm、厚さ20mmのアルミ板を当て、外側面を0.5mm厚さのウレタンシートで包み、ピニールテープをアルミ板で止めで密封し、水の入った圧力容器に入れ、破裂音が発生するまで徐々に圧力を高めて破裂させた（この圧力は「アイソスタティック強度」と称されている）。この時の圧力は30kPaであり、被覆層を設けなかったセラミックハニカム構造体は圧力13kPa/cm<sup>2</sup>で破裂したのに対し強度が約2倍に向上了っている。

実施例3

実施例2と同様の形状の乾燥されたコーチュライト製のセラミックハニカム体に、アルミニナセメントのモルタルを塗布し、乾燥させた後、機械加工し、最大外径100mm、真円度0.1mmのセラミックハニカム構造体を得た。

実施例4

リブ厚さ0.43mm、セル密度15.5セル/cm<sup>2</sup>、上部最大外径298mm、下部最大外径302mm、全長355mm、真円度4.1mmの乾燥された大型のコーチュライト製のDPF用セラミックハニカム体に、アルミニナセメントモルタルを外径約310mmになるように塗布して乾燥させ、この乾燥品を機械加工して外径305±0.3mm、上部および下部の真円度がそれぞれ0.2mm、0.4mmのセラミックハニカム構造体を得た。

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なお、上記実施例において、外径寸法、および真円度もしくは輪郭度の良い製品を得るために、セラミックハニカム体を予め小さく作製し、この外周に所定寸法の被覆層を設けるのが良い。外周壁にコーティングする材料としては、セラミックハニカム体と同一材質もしくは同一材質を一部に含む熱膨脹係数が類似の材質よりなるものが好適である。また、コーティングは焼成後に施し、再焼成しないことが、寸法精度上およびコスト上から好ましいが、セラミックハニカム体と被覆層が一体とならないので、熱衝撃が強い場合には、被覆層が剥離することもある。一方、生産性に同材質をコーティングし、焼成した場合にはセラミックハニカム体と被覆層が一体となり、熱衝撃では剥離することはないが、焼成による変形を受け易く、したがってセラミックハニカム構造体の寸法精度が若干劣る。さらに焼成品にコーティングを施し再焼成する場合は、剥離もなく寸法精度上も好ましいが、コスト上で不利となる。以上の3種類のコーティング材を施す方法は、用途に応じて選択することが必要である。

以上本考案の実施例について説明したが、本考案は上記実施例に限定されるものではなく、種々に変更および変形することができる。例えば、実施例において円筒体について説明したが、本考案は円筒外径品についても同様\*

\*に適用することができる。また、材質はコージェライトを用いたが、他の材料を用いても良い。被覆層は、セラミックハニカム構造体の全周にわたって被覆する必要はなく、一部分のみに被覆させることもできる。

また、被覆層は、セラミックハニカム体に触媒を担持させる前或いは担持させた後でも施すことができる。

【考案の効果】

本考案により、セラミックハニカム構造体は所定の外径寸法および所定の円筒度を有することができ、しかも寸法精度が良くなるため、排ガス触媒装置および排ガス淨化装置に適用する際に一定の厚さの比較的薄いシール材を使用することができ、経済的にも良好となる。さらに、押出し成型上発生するセラミックハニカム体の外周の微小な凹凸を埋めて平滑な表面とし、ガスシール性能が向上する。

【図面の簡単な説明】

第1図は本考案のセラミックハニカム構造体を示す斜視図である。

- 1…セラミックハニカム体
- 2…隔壁
- 3…外周壁
- 4…貫通孔
- 5…被覆層
- 6…セラミックハニカム構造体

【第1図】

